The World of SHARP APL

CANADA

Calgary	Suite 1000, 615 — 2nd Street SE Calgary, Alberta T2G 4T8	(403) 265-7730
Edmonton	Suite 310, 9939 Jasper Ave., Edmonton, Alberta T5J 2W8	(403) 426-5313
London, Ont	Suite 1400, 275 Dundas St. City Centre, Canada Trust Tower London, Ontario N6B 1L1	(519) 434-2426
Montreal	Suite 1610, 555 Dorcester Blvd. West Montreal, Quebec H2Z 1B1	(514) 866-4981
Ottawa	Suite 600, 265 Carling Avenue Ottawa, Ontario K1S 2E1	(613) 236-9942
Toronto	14th Floor, 145 King St. W. Toronto, Ontario M5H 1J8	(416) 364-5361
Vancouver	Suite 604, 1112 West Pender St. Vancouver, B.C. V6E 2S1	(604) 682-7158

UNITED STATES

Boston	Suite 812, 148 State St. Boston, Mass. 02109	(617) 523-2506
Chicago	Suite 424, 8501 West Higgins Rd. Chicago, Illinois 60631	(312) 693-5895
Dallas	Suite 1148, Campbell Centre 8350 Northcentral Expressway Dallas, Texas 75206	(214) 369-1131
Los Angeles	Suite 1135, 610 Newport Centre Drive Newport Beach, Ca. 92660	(714) 644-5112
Minneapolis, St. Paul	Suite 104, 5001 Cedar Lake Rd. St. Louis Park, Minnesota 55416	(612) 374-9406
New York City	Suite 250, East Mezz., Pan Am Bldg. New York, NY 10017	(212) 986-3366
Rochester	Suite 1150, 183 Main Street E. Rochester, NY 14606	(716) 546-7270
San Francisco	Suite C409, 900 North Point Street San Francisco, Ca. 94109	(415) 673-4930
Seattle	Suite 3735, SeaFirst Building 1001 Fourth Ave., Seattle Wa. 98154	(206) 938-0500
Washington D.C.	1815 North Fort Myer Dr. Arlington Va. 22209	(703) 527-3333

EUROPE

Gloucester, England	29 Northgate Street Gloucester.	0452 28106
London, England	118 — 119 Piccadilly Mayfair, London W1V 9FJ	(01) 629-1564
Amsterdam, Netherlands	Intersystems B.V. Herengracht 244, Amsterdam 1002	(020) 25 04 01
Brussels, Belgium	APL Europa S.A. Ave. du General de Gaulle 39 105 Bruxelles, Belgium.	649 94 30
Dusseldorf, W. Germany	Kaiser Friedrich Ring 98 4000 Dusseldorf W. Germany	

I. P. Sharp Associates Limited
I. P. Sharp Associates Inc.
I. P. Sharp Associates Limited (U. K.)
Intersystems B. V.

Introduction

SHARP APL is a man/computer interface which promotes rapid development of systems for commercial application. The most appealing characteristics of *SHARP APL* are its economy, naturalness, clarity, and power.

Businessmen favour *SHARP APL* because it allows them to concentrate on day to day problems rather than the problem of how to use the computer. Professionals such as corporate controllers, distribution managers, financial analysts, and economists rely on *SHARP APL* as a computer language which parallels the natural thinking process of people. The power of APL is made obvious when you attempt to achieve the same thing in a lower level language such as Fortran, COBOL, or BASIC.

The use of *SHARP APL* means dramatic savings in time and money. In the development phase, its interactivity, power, and freedom from rigid procedures and syntax save programming time. In the production phase, batch *SHARP APL* offers substantial rate reductions in computer costs. Because *SHARP APL* encourages modularity and the use of tested library routines, maintenance and system changes are easy to accomplish at low cost.

Naturalness, clarity, and economy do not imply, of course, the inability to cope with sophisticated complex problems. In the hands of programmers or system designers, *SHARP APL* is used for applications ranging from design of the next generation of computers, to cross-compilers, to large on-line management information systems.

In the following pages, we offer examples and explanations of what constitutes *SHARP APL*. The scope of facilities available make it an attractive approach for solving your problems.

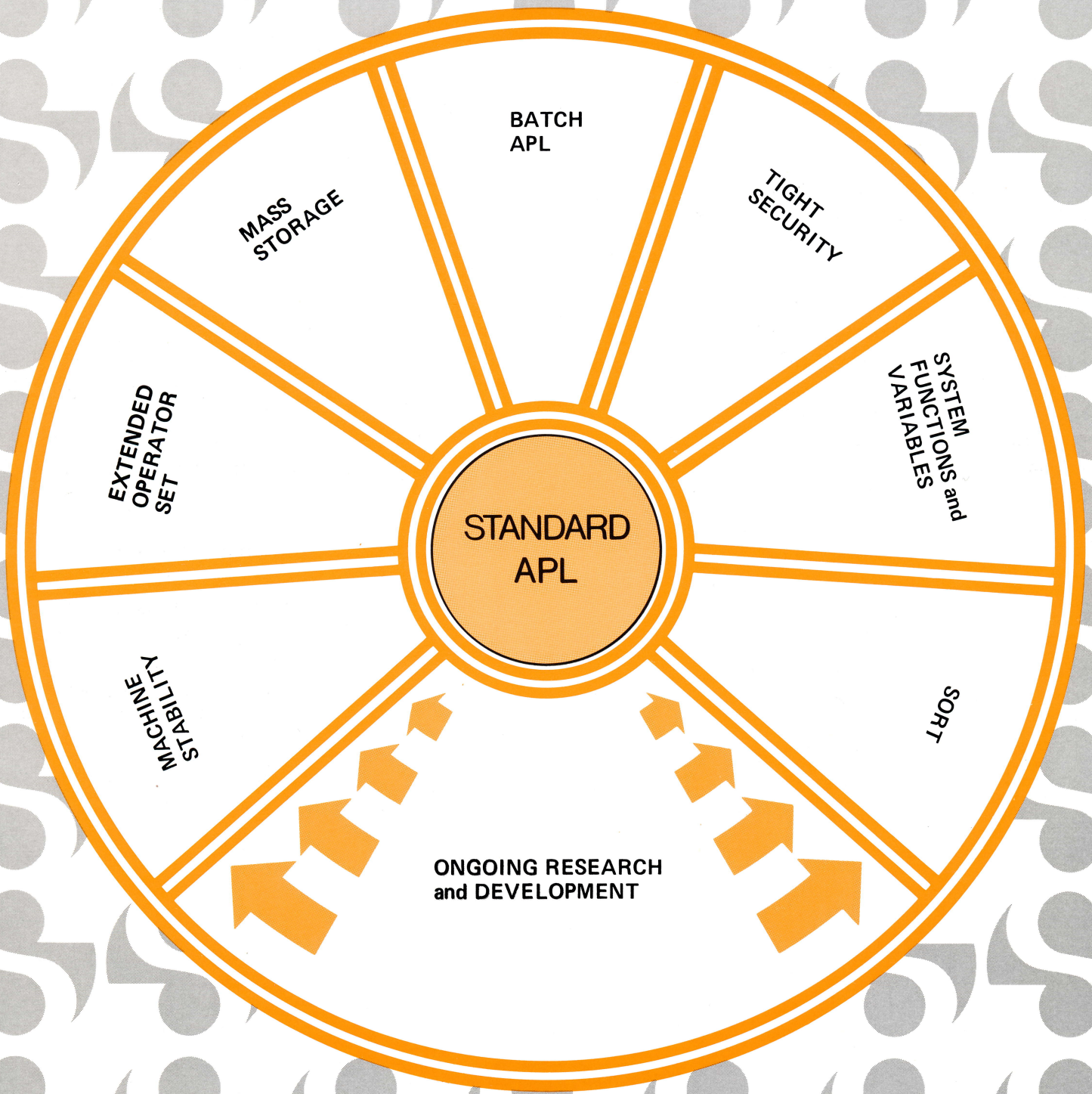
Orderly Growth

APL is a concept of mathematical notation, formulated and published by Dr. Kenneth E. Iverson.* APL is unique as a computer language. It was developed as a means of communicating logical and mathematical concepts among people. It is this origin of APL as a people language which accounts for the simplicity and power of APL as a computer language.

Development of APL has always been our first priority and since its inception we have been regarded as the innovators in enhancements and implementations. Industry recognition of this standard is evidenced in the APL interpreters we have written for major computer manufacturers. Roger Moore of I.P. Sharp Associates, and two of his colleagues who participated in the implementation of APL/360, were honored with the 1973 Grace Hopper Award of the Association for Computing Machinery for "setting new standards in simplicity, efficiency, reliability and response time for interactive systems".

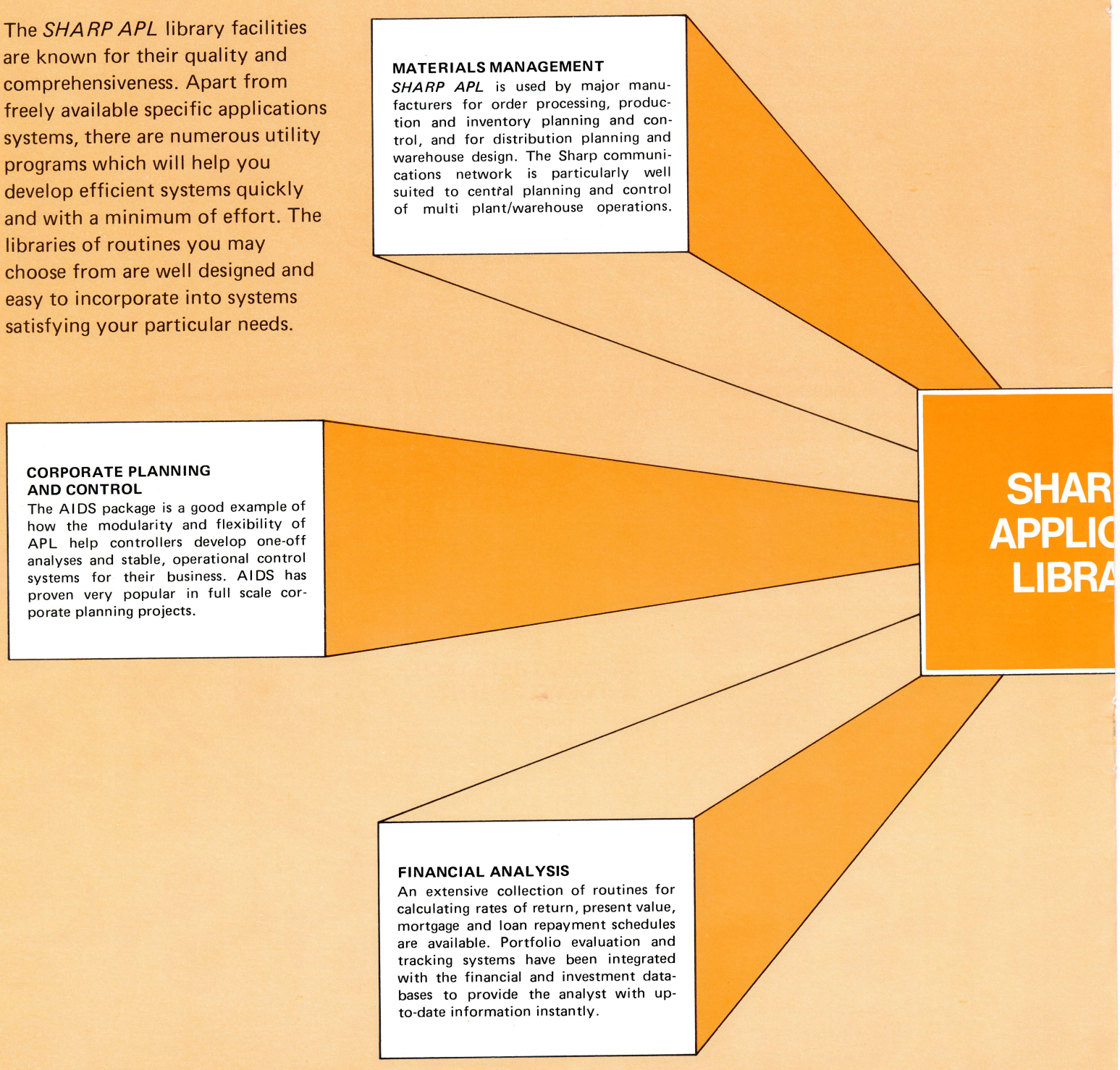
Since 1969, after our first commercial timesharing service was offered, the company has attracted an experienced and respected systems development group. Continuous development activity has incorporated the desirable and distinctive features which make *SHARP APL* the 'industry standard'. Perhaps the most important facet of this success has been the careful attention we pay to definition of new features. There is never a scarcity of new *SHARP APL* features. However, in our enhancements, the elegance and simplicity of APL is preserved in the implementation. The result of this continuous development is a proprietary program product, *SHARP APL.*

*A Programming Language, Wiley, 1962.


BATCH
APL
TIGHT
SECURITY
SYSTEM
FUNCTIONS and
VARIABLES
SORT
ONGOING RESEARCH
and DEVELOPMENT
MACHINE
STABILITY
EXTENDED
OPERATOR
SET
MASS
STORAGE
STANDARD
APL

To Save Development Time ...

The *SHARP APL* library facilities are known for their quality and comprehensiveness. Apart from freely available specific applications systems, there are numerous utility programs which will help you develop efficient systems quickly and with a minimum of effort. The libraries of routines you may choose from are well designed and easy to incorporate into systems satisfying your particular needs.



ACTUARIAL ANALYSIS
Actuarial applications in *SHARP APL* demonstrate how a professional benefits from a high level interactive language. APL is known to be an ideal medium for expressing actuarial principles. It enables computation of complex formulae in a short time. A library package of insurance and annuity functions allow calculation of these quantities on any age and interest rate bases. A wide selection of mortality tables provide further convenience.

ECONOMETRICS AND STATISTICS
An extensive collection of tested modules is available for econometric and statistical analysis. The broad categories covered include simple regression, data manipulation, hypothesis testing, prediction and distributed lags, instrumental variables, non-linear estimation, analysis of variance and cross tabulation. Naturally, X11 and Box Jenkins techniques are available.

MATHEMATICS AND UTILITIES
Some of the mathematical programs available in the libraries are under the headings of linear programming, linear algebra, eigenvalues, complex numbers, Fourier transforms, Differential equations, coordinate geometry, Stress and Strain and mathematical games. Some of the utilities include plotting, circuit analysis, simulation workspace documenter, and a host of others to make your job easier.

The *SHARP APL* library is lucidly documented so that you can quickly understand what the programs do and what information they require. You are not forced to learn by osmosis. The documentation for each library is available in both hard copy and on-line versions. For your convenience, an extensive set of current manuals covering major application systems and *SHARP APL* facilities is available from your local *SHARP APL* representative.

SHARP APL is easy to use

In the following example, *SHARP APL* is demonstrated in a simple context. To accommodate larger amounts of data would require no additional instructions. To extend the depth of analysis would require only a marginal increase in the number of instructions.

Consider office expenses for 4 departments. These few lines of *SHARP APL* will determine the variance of budgeted against actual expenditures.

```
ACTUAL ← 144  263.11  92  551.55
BUDGET ← 150  270     90  505
VARIANCE ←    ACTUAL-BUDGET
```

There are now four figures in *VARIANCE,* one per department. To calculate the percentage variation and save it for later use we could:

```
PVAR ← 100 X VARIANCE ÷ BUDGET
```

To display any one of the results we have created, we merely type the name:

```
      VARIANCE
¯6    ¯6.89   2    46.55
```

To find the total variance against budget across the 4 departments we would use + / (pronounced 'plus reduce')

```
+ / VARIANCE
  35.66
```

Or if we were interested in the largest variance we would use ⌈ / (pronounced 'maximum reduce')

```
⌈ / VARIANCE
  46.55
```

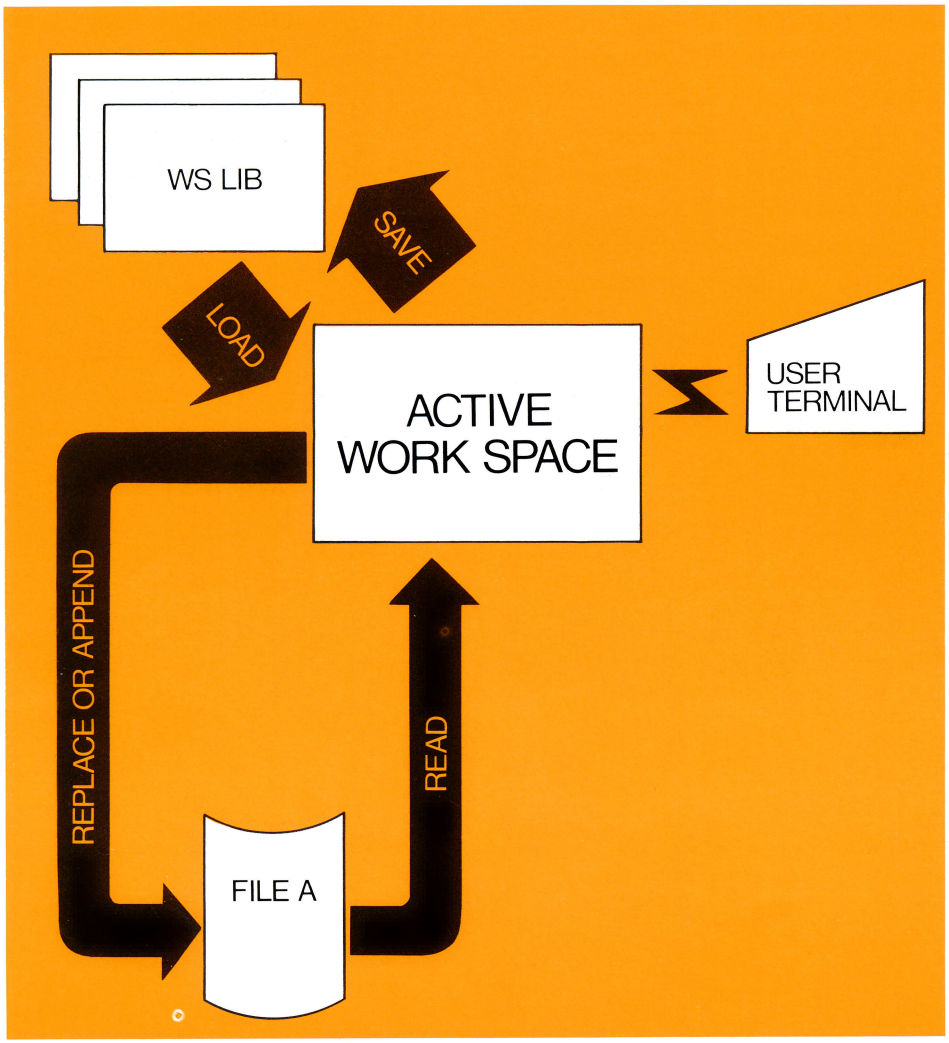
Of course all of these manipulations are accomplished with an APL program as they were in the 'desk calculator' mode shown above.

The efficiency of batch and mass storage

The file handling capability is an important extension of *SHARP APL*. The user may create as many files as he wishes, with virtually no restrictions on file size. Data are stored and retrieved from files by commands like □*REPLACE* and □*READ*.

Users are able to develop private libraries of workspaces, and can also access public libraries prepared for their use by I.P. Sharp Associates and other APL experts.

The large scale highspeed computers on which *SHARP APL* operates, accommodate many users at once, each receiving quick response to his programs and requests for information. Since the computers are dedicated to *SHARP APL*, no contention problems arise and all activity proceeds in an orderly fashion with an outstanding uptime record.



There are two modes in which *SHARP APL* functions operate: interactive and batch. In the interactive mode, a remote computer terminal provides input and receives output while using the communications network and interacting with the file system. In the batch mode, operation is almost identical, except that the APL job does not involve use of the communications network. Input and output in the batch mode are done through the files facility.

The *SHARP APL* system environment can be viewed as shown in the diagram below. Each user has a library of workspaces available to him, it contains programs and data activated during a session by typing *) LOAD* followed by the name of the workspace. Once loaded, programs can be run and data or programs can be altered, deleted or added. An altered workspace can be saved in its new form by typing *) SAVE*. Portions of various workspaces may be brought into the active workspace by the *) COPY* command.

Data Bases in SHARP APL

I.P. Sharp Associates maintain an impressive collection of public databases detailing the economics, demographics, security markets, and specific industry activity for large segments of 25 countries. Some examples of these popular databases include:

- OECD database of national accounts and indicators for 25 countries
- Insurance actuarial tables
- Civil Aviation databases
- Stock Prices on major North American Exchanges
- Stock Options activity on major North American Exchanges
- Fundamental facts on listed corporations
- NBER database of U.S. Economic activity
- Large subset of the CANSIM database
- CANDIDE based forecasts
- Canadian Chartered Banks database
- Emergency oil spill equipment locator database

Many of the public databases are extremely large and detailed. As an example, some of the subsections in the Aviation database are:

Sub-section	Source	Description
B1	CAB	Balance Sheet
B43	CAB	Hull, Engine Inventory
P1	CAB	Income Statement
P3	CAB	Revenues, Depr. & Amort.
P5	CAB	Operating Expense by type
P6	CAB	Maintenance Admin. Expenses
P7	CAB	Aircraft, Promotion, Expenses
P8	CAB	Aircraft, Promotion, Expenses
P10	CAB	Labour Expense
T1	CAB	Traffic by Class of Service
T2	CAB	Traffic by Aircraft Type
T3	CAB	Airport (Station) Activity
T7	CAB	Traffic by Market Segment
O&D	CAB	Passenger Origin-Destination Data
CT3	STATCAN	Income Statement (Canada)
CT4	STATCAN	Operating Statistics (Canada)
RB1	EARB	Traffic by class of Service (Europe)

This information has been used for a variety of purposes by the financial, marketing and planning departments for major carriers, manufacturers and financiers, and consultants associated with the aviation industry.

Many billions of bytes of on-line storage are available for your own personal databases. The *SHARP APL* database system is recognized for its tight security and reliability. Confidential data can be stored without fear of unauthorized access or accidental loss.

There is nothing more frustrating and tedious than poorly designed database retrieval and manipulative software. You will not have that problem with *SHARP APL* databases. Typically for each database there are several easy to use retrieval packages which can speed your analysis along. The manipulative and analytical software is extensive, flexible and never less than industry standard.

Support and Consulting

Most of what you want to do is easy to accomplish in *SHARP APL*, but to guarantee that your productivity remains high we stand by to support you with guidance, advice, and that second opinion which often makes the difference between adequate and superlative achievements.

We think you will find us amicable, very competent, and keenly interested in seeing you get the maximum for your money. We consider this an integral part of *SHARP APL* service. In each of our offices the staff is continually in contact with other specialists around the network. This enables them to remain current on the latest proven techniques and approaches for handling your kind of application system.

For those projects requiring more specialized experience or more time than you can spare, we can offer consulting services. The consulting approach can be highly effective since the chances are that we have done it before. In any case you will receive professional expertise and good value.

At convenient intervals, each of our offices holds courses and seminars on *SHARP APL* and related applications systems. These courses can be adjusted to your particular interests and conducted at your offices if it is more appropriate.

Over the years, our clients have formed close working relationships with us. We believe the single most important reason for this harmony is that they expect and receive the best in computing and expertise. We would not have it any other way.

Communications Network

For many years I.P. Sharp's clients in all the major centres throughout North America and Europe have had direct local access to the power of *SHARP APL*. The reliable communications links ensure that each user enjoys the same high quality in communications, regardless of his location. To achieve stability and flexibility, I.P. Sharp Associates has developed proprietary packet switching hardware and software. This state-of-the-art approach has the advantage of providing economical high speed transmission at major sites in the network.

Through the *SHARP APL* network, multinational corporations benefit from intra company shared usage of their proprietary financial, planning, distribution, and scheduling databases. The communications network is an important part of *SHARP APL* service. The proof of this is present in dozens of locations around the world.

Design – Phantasmagoria